CLAIM AMENDMENTS

2   **Listing of Claims:**

3   <u>What is claimed, is</u>

4

5   1. (original)   A wartermark signal generating apparatus for generating wartermark signals to be

6   embedded as a digital watermark in real-time contents, the wartermark signal generating

7   apparatus comprising:

8   input means for inputting the real-time contents;

9   an input buffer for storing the real-time contents;

10   generation means for generating, from the real-time contents, wartermark signals to be

11 outputted corresponding to predicted intensities of the real-time contents; and

12   an output buffer for storing the generated wartermark signals to be outputted,

13   wherein the generation means includes:

14   prediction means for predicting intensities of the wartermark signals from prediction of

15 perceptual stimulation values of the real-time contents after a predetermined lapse of time;

16   control means for controlling embedding by use of a message to be embedded as a digital

17 watermark in the real-time contents; and

18   means for generating the wartermark signals to be outputted by use of outputs from the

19 prediction means and outputs from the control means.

20 2. (original)   The wartermark signal generating apparatus according to claim 1,

21   wherein the perceptual stimulation values represent amplitude of sound or luminance, and

22

23   the prediction means generates a predicted inaudible amount or a predicted invisible

24 amount of wartermark signals corresponding to intensities of the real-time contents after the

25 predetermined lapse of time by use of data stored in the input buffer.

1   3. (currently amended)   The wartermark signal generating apparatus according to <u>claim 1</u>
2   ~~any one of claims 1 and 2~~, wherein the control means includes means for generating a value to be
3   embedded, which is a binary based on a positive and a negative, by use of a secret key, the
4   message and a pseudo-random number.

5   4. (currently amended)   The wartermark signal generating apparatus according to <u>claim 1</u>
6   ~~any one of claims 1 to 3~~, further comprising output controlling means for controlling outputs
7   from the output buffer by comparing the generated wartermark signals with the real-time
8   contents after a time needed to embed the generated wartermark signals has passed.

9   5. (currently amended)   The wartermark signal generating apparatus according to <u>claim 1</u>
10   ~~any one of claims 1 to 4~~,
11   wherein the input means includes means for dividing, and inputting, the real-time
12   contents, and
13   the generation means generates wartermark signals by use of the divided real-time
14   contents.

15   6. (original)   A wartermark signal generating method for generating wartermark signals to be
16   embedded as a digital watermark in real-time contents, the method comprising the steps of:
17   inputting the real-time contents;
18   storing the real-time contents;
19   generating, from the real-time contents, wartermark signals to be outputted corresponding
20   to predicted intensities of the real-time contents; and
21   storing the generated wartermark signals to be outputted,
22   wherein the generation step includes the steps of:
23   predicting intensities of the wartermark signals from prediction of perceptual stimulation
24   values of the real-time contents after a predetermined lapse of time;
25   controlling embedding by use of a message to be embedded as a digital watermark in the
26   real-time contents; and

1   generating the wartermark signals to be outputted by use of outputs from the prediction

2   step and outputs from the control step.

3   7. (original)   The wartermark signal generating method according to claim 6,

4   wherein the perceptual stimulation values represent sound or luminance, and

5   the prediction step includes a step of generating a predicted inaudible amount or a

6   predicted invisible amount of wartermark signals corresponding to intensities of the real-time

7   contents after the predetermined lapse of time by use of data stored in the step of storing the

8   real-time contents.

9   8. (currently amended) The wartermark signal generating method according to <u>claim 6</u> ~~any one of~~

10   ~~claims 6 and 7~~,

11   wherein the control step includes a step of generating a value to be embedded, which is a

12   binary based on a positive and a negative, by use of a secret key, the message and a

13   pseudo-random number.

14   9. (currently amended) The wartermark signal generating method according to <u>claim 6</u> ~~any one of~~

15   ~~claims 6 to 8~~, further comprising a step of controlling outputs from the step of storing the

16   generated wartermark signals to be outputted, by comparing the generated wartermark signals

17   with the real-time contents after a time needed to embed the generated wartermark signals has

18   passed.

19   10. (currently amended) The wartermark signal generating method according to <u>claim 6</u> ~~any one~~

20   ~~of claims 6 to 9~~,

21   wherein the input step includes a step of dividing the real-time contents, and

22   the generation step includes a step of generating the wartermark signals by use of the

23   divided real-time contents.

24   11. (original) A program for causing a wartermark signal generating method to be executed, the

25   program being computer-executable one for causing a computer to execute the method for

1   generating wartermark signals to be embedded as a digital watermark in real-time contents, the

2   program causing the computer to execute the steps of:

3   storing the real-time contents which have been inputted;

4   generating, from the real-time contents, wartermark signals to be outputted corresponding

5   to predicted intensities of the real-time contents; and

6   storing the generated wartermark signals to be outputted,

7   wherein the generation step includes the steps of:

8   predicting intensities of the wartermark signals from prediction of perceptual stimulation

9   values of the real-time contents after a predetermined lapse of time;

10   controlling embedding by use of a message to be embedded as a digital watermark in the

11   real-time contents; and

12   generating the wartermark signals to be outputted, by use of outputs from the prediction

13   step and outputs from the control step.

14   12. (original) The program according to claim 11,

15   wherein the perceptual stimulation values represent sound or luminance, and

16   the prediction step includes a step of generating a predicted inaudible amount or a

17   predicted invisible amount of wartermark signals corresponding to intensities of the real-time

18   contents after the predetermined lapse of time by use of data stored in the step of storing the

19   real-time contents which have been inputted.

20   13. (currently amended)   The program according to <u>claim 11</u> ~~any one of claims 11 and 12~~,

21   wherein the real-time contents which have been divided and inputted are used in the

22   generation step, and

23   the control step includes a step of generating a value to be embedded, which is a binary

24   based on a positive and a negative, by use of a secret key, the message and a pseudo-random

25   number.

26   14. (currently amended) The program according to <u>claim 11</u> ~~any one of claims 11 to 13~~, further

27   comprising a step for controlling outputs from the step of storing the generated wartermark

1 signals to be outputted, by comparing the generated wartermark signals with the real-time

2 contents after a time needed to embed the generated wartermark signals has passed.

3 15. (original) A computer-readable storage medium, in which a computer-executable program for

4 causing a computer to execute a method for generating wartermark signals to be embedded as a

5 digital watermark in real-time contents is stored,

6   wherein the program causes the computer to execute the steps of:

7   storing the inputted real-time contents;

8   generating, from the real-time contents, wartermark signals to be outputted corresponding

9 to predicted intensities of the real-time contents; and

10   storing the generated wartermark signals to be outputted,

11   wherein the generation step includes the steps of:

12   predicting intensities of the wartermark signals from prediction of perceptual stimulation

13 values of the real-time contents after a predetermined lapse of time;

14   controlling embedding by use of a message to be embedded as a digital watermark in the

15 real-time contents; and

16   generating the wartermark signals to be outputted, by use of outputs from the prediction

17 step and outputs from the control step.

18 16. (original) The storage medium according to claim 15,

19   wherein the perceptual stimulation values represent sound or luminance, and

20   the prediction step includes a step of generating a predicted inaudible amount or a

21 predicted invisible amount of wartermark signals corresponding to intensities of the real-time

22 contents after the predetermined lapse of time, by use of data stored in the step of storing the

23 real-time contents.

24 17. (currently amended)   The storage medium according to <u>claim 15</u> ~~any one of claims 15~~

25 ~~and 16~~,

26   wherein the real-time contents which have been divided and inputted are used in the

27 generation step, and

1   the control step includes a step of generating a value to be embedded, which is a binary

2   based on a positive and a negative, by use of a secret key, the message and a pseudo-random

3   number.

4   18. (currently amended)   The storage medium according to claim 15 any one of claims 15 to

5   17, further comprising a step for controlling outputs from the step of storing the generated

6   wartermark signals to be outputted, by comparing the generated wartermark signals with the

7   real-time contents after a time needed to embed the generated wartermark signals has passed.

8   19. (original) A digital wartermark embedding apparatus for embedding a digital wartermark in

9   real-time contents, the apparatus comprising:

10   input means for inputting the real-time contents;

11   an input buffer for storing the real-time contents;

12   generation means for generating, from the real-time contents, wartermark signals to be

13   outputted corresponding to predicted intensities of the real-time contents;

14   an output buffer for storing the generated wartermark signals to be outputted; and

15   embedding means for receiving the generated wartermark signals, and for embedding the

16   generated wartermark signals in the real-time contents,

17   wherein the generation means includes:

18   prediction means for predicting intensities of the wartermark signals from prediction of

19   perceptual stimulation values of the real-time contents after a predetermined lapse of time;

20   control means for controlling embedding by use of a message to be embedded as a digital

21   watermark in the real-time contents; and

22   means for generating the wartermark signals to be outputted, by use of outputs from the

23   prediction means and outputs from the control means.

24   20. (original) The digital wartermark embedding apparatus according to claim 19,

25   wherein the perceptual stimulation values represent sound or luminance, and

1   the prediction means generates a predicted inaudible amount or a predicted invisible

2   amount of wartermark signals corresponding to intensities of the real-time contents after the

3   predetermined lapse of time by use of data stored in the input buffer.

4   21. (currently amended)   The digital watermark embedding apparatus according to claim 19

5   ~~any one of claims 19 and 20~~, wherein the control means includes means for generating a value to

6   be embedded, which is a binary based on a positive and a negative, by use of a secret key, the

7   message and a pseudo-random number.

8   22. (currently amended)   The digital watermark embedding apparatus according to claim 19

9   ~~any one of claims 19 to 21~~, further comprising output controlling means for controlling outputs

10   from the output buffer by comparing the generated wartermark signals with the real-time

11   contents after a time needed to embed the generated wartermark signals has passed.

12   23. (currently amended)   The digital watermark embedding apparatus according to claim 19

13   ~~any one of claims 19 to 22~~, wherein the input means includes means for dividing and inputting

14   the real-time contents, and

15   the generation means generates wartermark signals by use of the divided real-time

16   contents.

17   24. (currently amended) The digital watermark embedding apparatus according to claim 19 ~~any~~

18   ~~one of claims 19 to 23~~, wherein the real-time contents are music to be played live.

19   25.   (currently amended) The digital watermark embedding apparatus according to ~~any one of~~

20   ~~claims 19 to 24~~, wherein the real-time contents are broadcast contents to be broadcast live.

21   26. (currently amended)   The digital watermark embedding apparatus according to claim 19

22   ~~any one of claims 19 to 25~~, wherein the digital watermark embedding apparatus is included in an

23   external device of a digital television apparatus or in the digital television apparatus.

1   27. (original)   A digital television apparatus, comprising:

2   means for receiving a digital broadcast, for decoding the digital broadcast, and for

3   generate the real-time contents ;

4   display means for displaying the generated real-time contents; and

5   a digital watermark embedding apparatus for embedding a digital watermark in the

6   decoded real-time contents,

7   wherein the digital watermark embedding apparatus includes:

8   input means for inputting the real-time contents;

9   an input buffer for storing the real-time contents;

10   generation means for generating, from the real-time contents, wartermark signals to be

11   outputted, corresponding to predicted intensities of the real-time contents;

12   an output buffer for storing the generated wartermark signals to be outputted; and

13   embedding means for receiving the generated wartermark signals to be outputted, and for

14   embedding the generated wartermark signals to be outputted in the real-time contents,

15   wherein the generation means includes:

16   prediction means for predicting intensities of the wartermark signals from prediction of

17   perceptual stimulation values of the real-time contents after a predetermined lapse of time;

18   control means for controlling the embedding by use of a message to be embedded as a

19   digital watermark in the real-time contents; and

20   means for generating the wartermark signals to be outputted, by use of outputs from the

21   prediction means and outputs from the control means.

22   28. (original) The digital television apparatus according to claim 27, wherein the digital

23   watermark embedding apparatus is included in an external device of the digital television

24   apparatus or in the digital television apparatus.

25   29. (currently amended)   The digital television apparatus according to <u>claim 27</u> any one of

26   claims 27 and 28,

27   wherein the input means includes division means, and

28   the control means controls the embedding by use of the message and a secret key.

1   30. (new) A computer program product comprising a computer usable medium having computer

2   readable program code means embodied therein for causing watermark signal generation, the

3   computer readable program code means in said computer program product comprising computer

4   readable program code means for causing a computer to effect the functions of claim 1.

5   31. (new) A computer program product comprising a computer usable medium having computer

6   readable program code means embodied therein for causing watermark signal generation, the

7   computer readable program code means in said computer program product comprising computer

8   readable program code means for causing a computer to effect the functions of claim 19.

9   32. (new) A computer program product comprising a computer usable medium having computer

10   readable program code means embodied therein for causing functions of digital television, the

11   computer readable program code means in said computer program product comprising computer

12   readable program code means for causing a computer to effect the functions of claim 27.

13   33.   (new) An article of manufacture comprising a computer usable medium having computer

14   readable program code means embodied therein for causing watermark signal generation, the

15   computer readable program code means in said article of manufacture comprising computer

16   readable program code means for causing a computer to effect the steps of claim 6.